

REMARKS

The Official Action of March 6, 2008, and the prior art relied upon therein have been carefully studied. The claims in the application are now claims 1-9, 11-26, 28-31 and new claims 39-43. The new claims are all dependent and thus incorporate the subject matter of the claims from which they depend. Applicants' claims define novel and unobvious subject matter for the reasons pointed out below, and therefore should be allowed. Favorable reconsideration and allowance are respectfully requested.

The present application is the National Phase of PCT IL04/00613, and claims benefit and priority from U.S. Provisional application 60/485,731, of July 10, 2003.

The drawings have been objected to on the basis that Figs. 7A and 7B "are of very poor quality and half of the drawings cannot be seen."

As the present application is the U.S. National Phase of a PCT application, the official application papers including the drawings will have been those forwarded to the PTO by WIPO, in which case the drawings should have been adequate. Nevertheless, attached hereto are replacement

drawings for Figs. 7A and 7B. Approval and entry are respectfully requested.

The examiner has helpfully pointed out a number of informalities in claims 1-7, 14 and 16-38, and consequently these claims have been objected to. The objections are respectfully traversed, especially to the extent that they might still presently be deemed to apply.

Claims 1-7, 14, 21, 23 and 29 have been amended to correct the clerical or typographical errors, and are believed to now be in better form. Claims 27 and 32-38 have been deleted without prejudice.

As regards claims 2 and 6, rather than using classical Markush language, the claims have been amended to use the expression "at least one of the following".

Withdrawal of the rejection is respectfully requested.

Claims 7 and 9 have been rejected under the first paragraph of Section 112 as being of such a broad scope that applicants' specification does not enable one skilled in the art to practice these claims. This rejection is respectfully traversed.

When the specification states that mixtures or combinations can be used, this clearly means any mixtures or

combinations of the enumerated items, and there is no reason to doubt that any such mixtures or combinations are functional, i.e. there is no reason to believe they are not functional. However, to the extent that any experimentation would be required to determine functionality, such experimentation would be only "routine", which is fully permissible under the first paragraph of Section 112.

Nevertheless, the offensive language has been deleted from claims 7 and 9, without limiting the claims and without any intention to limit such claims. By introducing the expression "at least one of the following", the options of mixtures of elements listed in original claim 7, and combinations of elements listed in original claim 9 are supported by the original description, for example being CdSe/CdS and Co-Cr, Cr-Au, Pt-Ir, Ti-Pt respectively as described in the specification page 3 paragraphs 39 and 40:

"Additionally, combinations of the above in composite structures consisting of sections with different semiconductor materials, for example CdSe/CdS or any other combinations, as well as core/shell structures of different semiconductors such as for example CdSe/ZnS core/shell nanorods [12], are also within the scope of the present invention."

"Alternatively, the nanoparticles are made of metal such as for example gold, silver, platinum, palladium, copper, iron, nickel, titanium, iridium, cobalt, chromium, bismuth, indium and alloys or mixtures such as Co-Cr, Cr-Au, Pt-Ir, Ti-Pt. "

Withdrawal of the rejection is in order and is respectfully requested.

Claims 6, 7, 9, 10 and 32-38 have been rejected under the second paragraph of Section 112. The rejection is respectfully traversed.

As noted above, claims 10 and 32-38 have been deleted without prejudice, so applicants need not address this rejection with respect to those claims at the present time.

Claims 6, 7 and 9 have been amended to better conform to U.S. practice. For the record, applicants submit that the claims as previously drafted, especially when considered in light of applicants' specification (fully consistent with the law), would not have been confusing to those skilled in the art, and therefore the claims in their previous form are fully in accordance with Section 112. At **worst**, the criticized language in its previous form might be considered objectionable, but **only** as to form, requiring no substantial amendments relating to patentability.

The amendments have been made in deference to the examiner's views and to avoid or minimize needless argument; and are of a formal cosmetic nature only, i.e. made to place the claims in improved form for U. S. practice. Such amendments are not "narrowing" amendments because the scope of the claims has not been reduced in these regards. No limitations have been added in these regards and none are intended.

Withdrawal of the rejection is in order and is respectfully requested.

Claims 32-38 have been rejected under Section 101 as being in a non-statutory form.

These claims have now been deleted without prejudice, i.e. without dedication, disclaimer, abandonment, forfeiture, renunciation or concession as to the subject matter intended to be covered by these claims, such subject matter being covered by other method claims including newly presented claims 39-42.

Claims 1-9, 11, 12 and 16-38 have been rejected as anticipated by Quake USP 6,002,471. This rejection is respectfully traversed.

The present invention is aimed at providing tips functionalized with nanoparticles, methods for binding nanoparticles to tips and the use of such tips in nanometer and molecular scale imaging techniques. This is implemented by binding nanoparticles, comprising nanocrystals, to a substrate layer of a tip device (or a portion thereof), such that the nanocrystals and a sample material act as a donor-acceptor or acceptor-donor pair.

Basic Claim 1 has been amended to better point out the above, namely to read:

"A tip device having at least a portion thereof comprising a substrate layer functionalized by nanoparticles comprising nanocrystals which are bound to a surface of said substrate, the nanocrystals acting as active media capable of interacting with a predetermined sample to form with said sample a donor-acceptor or acceptor-donor pair, said interaction of the tip with the sample modifying light emission of the sample by transferring or accepting energy to or from the sample".

This amendment is supported by the description - see for example:

- page 11 lines 1-2 *"Fig. 2 illustrate AFM images (A-H) of glass substrates after various treatments tested",*

page 10 lines 28-29: "Fig. 1 is a schematic representation of a tip device functionalized by semiconductor nanocrystals according to the invention.";

- page 7 line 10: "The nanoparticles are preferably nanocrystals",

- page 13 lines 5-6: "It should be understood that this process may be achieved by utilizing acceptor-tip and donor-sample as well.";

- page 10 lines 9-12: "In a further aspect, the present invention provides a method for use in imaging a sample by exciting the sample with electromagnetic radiation and following the emitted light produced as a result of interaction between donor-acceptor pair formed by the above-described tip and the sample.",

- page 6 lines 15-21 "The term "active media" is meant to denote a media capable of interacting with electromagnetic radiation resulting in: 1. absorption of the radiation followed by transfer of the energy to an acceptor or in producing a beam of optical radiation by stimulating electronic, ionic, or molecular transitions to higher energy levels so that when they return to lower energy levels they emit energy or 2. in accepting energy from a donor entity."

Quake discloses a scanning Raman microscope for obtaining high-resolution information, utilizing a tip for

scanning a sample. This technique is aimed at enhancing a Raman signal from a metal coated AFM tip. The tip of the probe is preferably coated with a conductive layer (metallic layer) or with one or more conductive particles (e.g., silver particles). The conductive particles are supported on the probe by a metallic coating.

Therefore, the tip disclosed in Quake has no such portion, as claimed, which is bound to a layer of material comprising nanoparticles including nanocrystals, and which is functionalized with the conductive particles. Moreover, although Quake discloses the use of a thin silver layer (10-20 nm thick), the tip device does not utilize conductive particles comprising nanocrystals.

Therefore, the tip described in Quake is configured differently from that of the present invention, at least in that it does not utilize binding of nanocrystals to a substrate layer of the tip to functionalize the tip, and accordingly the Quake tip has different properties than that of the tip of the present invention. More specifically, according to Quake, the probe (having a tip-like or pyramid-like shape) may be single crystalline silicon or carbon coated with a conductive layer or with one or more conductive particles (e.g., silver particles).

As Quake does not show all the features claimed, it is clear that Quake does not anticipate claim 1 or any of the claims which depend therefrom.

As regards the independent Claim 8, it has been amended to read:

"A method of forming a tip device for use in analyzing a sample, the method comprising reacting a surface of at least a portion of the tip with nanoparticles comprising nanocrystals in solution, powder or film so as to bind said nanoparticles to said surface thereby functionalizing said surface by said nanoparticles capable of acting as active media interacting with a predetermined sample to form with said sample a donor-acceptor or acceptor-donor pair, said interaction of the tip with the sample modifying light emission of the sample by transferring or receiving energy to or from the sample, respectively."

Again, like with claim 1, it should be clear that Quake does not anticipate claim 8, and therefore does not anticipate any of the claims which depend from and incorporate the subject matter of claim 8.

Withdrawal of the rejection based on Section 102 is in order and is respectfully requested.

Claims 1-9, 11, 12 and 16-38 have been rejected under Section 102 as anticipated by Anderson USP 6,850,323. This rejection is respectfully traversed.

Similar to Quake, Anderson also discloses AFM tips for locally enhanced Raman spectroscopy. Here, sputter coating of gold on AFM tips is used. The term "particles" is used here to refer to discrete particle-like structures formed by this method, aimed at generating surface plasmons, which couple with the sample to produce the enhanced Raman signal.

A functionalized tip, prepared by binding nanocrystals to a tip's substrate (directly or via linking molecules) is not disclosed in Anderson.

It should be clear that Anderson does not anticipate any of applicants' claims. Withdrawal of the rejection is in order and is respectfully requested.

Claims 1-5, 7-17, 19, 21-28 and 32-38 have been rejected under Section 102 as anticipated by Pantano et al USP 6,487,326 (Pantano). This rejection is respectfully traversed.

Pantano discloses a sensor including a transparent metallic (gold) layer, accommodated on a fiber bundle, used as an electrochemical electrode with fluorescence readout. This

technique does not utilize nanocrystals functionalizing the tip.

Like Quake and Anderson, Pantano also clearly does not anticipate any of applicants' independent claims, and therefore does not anticipate any of applicants' claims. Withdrawal of the rejection is in order and respectfully requested.

New method claims 39-42 specify an example of a binding procedure as described in applicants' specification, e.g. see page 14, lines 2-8: *"The binding to the nanocrystals was performed by incubating the silanized substrates in nanocrystal solution, preferably at room temperature, although suitable temperatures range from the melting point of the solvent (e.g. for toluene -95° C), to the boiling point of the solvent (e.g. for toluene 110° C). After incubation, these substrates were further characterized by AFM, SEM and optical spectroscopy measurements."*

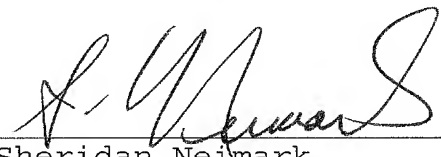
New device claim 42, reciting examples of the functional groups of the linker molecules, is described in the specification for example at page 8 lines 22-23: *"Non-limiting examples of suitable functional groups are silane, thiols, carboxylate, amines and the like."*

The prior art documents of record and not relied upon by the PTO have been noted, along with the implication that such documents are deemed by the PTO to be insufficiently material to warrant their application against any of applicants' claims.

Applicants believe that all issues raised in the Official Action have been addressed above in a manner that should lead to patentability of the present application. Favorable consideration and early formal allowance are respectfully requested.

Respectfully submitted,

BROWDY AND NEIMARK, P.L.L.C.
Attorneys for Applicant

By 
Sheridan Neimark
Registration No. 20,520

SN:jnj
Telephone No.: (202) 628-5197
Facsimile No.: (202) 737-3528
G:\BN\C\COHN\BANIN3A\PTO\2008-9-8AMPCT.doc